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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Zvonimir Gabric

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SLATER & MATSIL LLP
17950 PRESTON ROAD
SUITE 1000
DALLAS, TX 75252

EXAMINER

YUSHIN, NIKOLAY K

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/586,788	Applicant(s) GABRIC ET AL.	
	Examiner NIKOLAY YUSHIN	Art Unit 2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12 - 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12 - 21, 23 - 28 is/are rejected.
- 7) ☒ Claim(s) 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>04/02/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Oath/Declaration

The oath/declaration filed on 07/21/2006 is acceptable.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21 and 23 - 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Schindler et al., WO03/019649 (As cited by Applicant on 4/2/07. An English translation is available at US 2005 / 0079700).

In re Claim 21, Schindler discloses a semiconductor structure 1200 (Fig. 12) comprising: a substrate 1201; two electrically conductive structures (left 103 and right 103) over the substrate 1201, a sub-area 107 between the two electrically conductive structures (left 103 and right 103) being free of material; a layer of material containing silicon, oxygen and nitrogen (1202, 1203, 1204, 1205, 1206, 1207, 1209) overlying the two electrically conductive structures (left 103 and right 103); an intermediate layer (104, 1210) comprising an electrically insulating material overlying the layer of material containing silicon, oxygen and nitrogen (1202, 1203, 1204, 1205, 1206, 1207, 1209); and a covering layer (111, 1212) overlying the intermediate layer (104, 1210) and the sub-area 107 between the two electrically conductive structures (left 103 and right 103) such that the sub-area 107 comprises a material-free area that is sealed from the environment (Fig. 12, [0098 – 0104]).

In re Claim 23, Schindler discloses that the two electrically conductive structures 103 comprise copper structures (Fig. 12, [0062]).

In re Claim 24, Schindler discloses that the material-free area 107 comprises an air gap (Fig. 12, [0015]).

In re Claim 25, Schindler discloses the layer of material containing silicon, oxygen, and nitrogen (1202, 1203, 1204, 1205, 1206, 1207, 1209) (Fig. 12, [0098]). The applicant's claim 25 does not distinguish over the Schindler's device regardless of the process used to form the layer of material containing silicon, oxygen, and nitrogen, because only the final product is relevant, not the recited process of forming by a plasma-enhanced chemical vapor deposition process. See *SmithKline Beecham Corp. v. Apotex Corp.*, 78 USPQ2d 1097 (Fed. Cir, 2006 ("While the process set forth in the product-by-process claim may be new, that novelty can only be captured by obtaining a process claim."))

In re Claim 26, Schindler discloses that the intermediate layer (104, 1210) is silicon oxide (Fig. 12, [0098]). The applicant's claim 26 does not distinguish over the Schindler's device regardless of the process used to form the intermediate layer, because only the final product (a silicon oxide intermediate layer) is relevant, not the recited process of forming the layer from (a gaseous) silane-based silicon oxide (precursor). See *SmithKline Beecham Corp. v. Apotex Corp.*, 78 USPQ2d 1097 (Fed. Cir, 2006 ("While the process set forth in the product-by-process claim may be new, that novelty can only be captured by obtaining a process claim."))

Note that when "product by process" claiming is used to describe one or more limitations of a claimed product, the limitations so described are limitations of the claimed product per se, no matter how said product is actually made. In re Hirao, 190 USPQ 15 at 17 (footnote 3). See

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also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a “product by process” claim and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear. See also MPEP 706.03(e).

The Federal Circuit recently revisited the question of whether a “product by process” claim can be anticipated by a reference that does not recite said process. See *SmithKline Beecham Corp. v. Apotex Corp.*, 78 USPQ2d at 1100. The Federal Circuit cited with approval this Office’s current statement of the law, found in MPEP § 2113:

[Even] though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

Id. at 1101. The Federal Circuit held this statement to be consistent with its own views on this topic, as well as various Supreme Court rulings, notably *Gen. Elec. Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 373 (1938) (“Although in some instances a claim may validly describe a new product with some reference to the method of production, a patentee who does not distinguish his product from what is old except by reference, express or constructive, to the

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process by which he produced it, cannot secure a monopoly on the product by whatever means produced.”). Id.

In re Claim 27, Schindler discloses that the covering layer (111, 1211) comprises silicon oxide (Fig. 12, [0098]).

In re Claim 28, Schindler discloses that the covering layer (111, 1211) is formed based on ozone-activated decomposed tetraethyl orthosilicate (Fig. 12, [0103]).

Note the method of forming a device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight.

The applicant’s claim 28 does not distinguish over the Schindler’s device regardless of the process used to form the covering layer, because only the final product is relevant, not the recited process of forming the layer from on ozone-activated decomposed tetraethyl orthosilicate. See *SmithKline Beecham Corp. v. Apotex Corp.*, 78 USPQ2d 1097 (Fed. Cir, 2006 (“While the process set forth in the product-by-process claim may be new, that novelty can only be captured by obtaining a process claim.”))

Note that when “product by process” claiming is used to describe one or more limitations of a claimed product, the limitations so described are limitations of the claimed product per se, no matter how said product is actually made. In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a “product by process” claim and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear. See also MPEP 706.03(e).

The Federal Circuit recently revisited the question of whether a “product by process” claim can be anticipated by a reference that does not recite said process. See *SmithKline*

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Beecham Corp. v. Apotex Corp., 78 USPQ2d at 1100. The Federal Circuit cited with approval this Office's current statement of the law, found in MPEP § 2113:

[Even] though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

Id. at 1101. The Federal Circuit held this statement to be consistent with its own views on this topic, as well as various Supreme Court rulings, notably Gen. Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 373 (1938) ("Although in some instances a claim may validly describe a new product with some reference to the method of production, a patentee who does not distinguish his product from what is old except by reference, express or constructive, to the process by which he produced it, cannot secure a monopoly on the product by whatever means produced."). Id.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12, 13, 14, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schindler et al. in view of Vogt, WO 2003102264 (English translation US 2006 / 0084236).

Schindler discloses a method for producing a layer arrangement 1200 (Fig. 12), the method comprising: forming, in a process chamber, a layer of oxygen material (1203, 1205, 1207) and nitrogen material (1202, 1204, 1206, 1209) over a substrate 1201 that has a plurality of electrically conductive structures (left 103 and right 103) and/or over a part of a surface of the electrically conductive structures, the layer being formed using a plasma-enhanced chemical vapor deposition process ([0098]) with oxygen material by means of an organic silicon precursor material (TEOS), the layer of oxygen material (1203, 1205, 1207) and nitrogen material (1202,

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1204, 1206, 1209) being formed in such a manner that an area 107 free of material remains between the electrically conductive structures (left 103 and right 103); forming an intermediate layer 1210 comprising an electrically insulating material over the layer of oxygen material (1203, 1205, 1207) and nitrogen material (1202, 1204, 1206, 1209) ([0102 – 0104]); and selectively forming a covering layer 111 over the intermediate layer 1210 such that the area 107 free of material between the electrically conductive structures (left 103 and right 103) is sealed from the environment and forms a cavity ([0104]).

In re Claim 13, Schindler discloses the organic silicon precursor material comprises tetraethyl orthosilicate ([0098]).

The only difference between the Applicant's claims 12, 13 and the method of Schindler is that Schindler does not specify that nitrogen material being supplied during the supply of silicon material.

Vogt teaches a method of for producing a layer arrangement, which includes a step of the nitrogen material being supplied during the supply of silicon material ([0070], [0075]).

Additional differences between the Applicant's claims 14 and 19 and the method of Schindler is that Schindler does not teach using nitrogen as a further precursor material or forming the oxygen material and nitrogen material layers while setting a pressure in the process chamber between 1600 Pa and 5300 Pa.

In re Claim 14, Vogt discloses using nitrogen as a further precursor material ([0025]), while in re Claim 19, Vogt discloses forming layers of oxygen material and nitrogen material while setting a pressure in the process chamber between 1600 Pa and 5300 Pa ([0034]).

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It would have been obvious to one having ordinary skill in the art at the time of the invention was made to combine teachings of Schindler and Vogt, and to supply nitrogen during the supply of silicon material to provide sufficient mechanical and electrical stability as suggested by Vogt ([0012]).

Claims 15 - 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schindler in view of Vogt as applied to claim 14 above, and further in view of Hayashide et al., US 6,914,011.

Schindler and Vogt suggest a method having all the limitations of claims 15 -17 except for the specific flow-rate ratios of tetraethyl orthosilicate to nitrogen.

Hayashide teaches the film deposition with different flow-rate ratios of tetraethyl orthosilicate / film deposition gas to nitrogen (Figs. 4, 11, 17; column 5, lines 4 – 18).

Hayashide also demonstrate that the flow-rate ratio is a result effective variable because it affects on the film deposition rate (column 5, lines 4 – 18). Hayashide teaches a range of flow-rate ratios that overlap the ranges claimed in claims 15-17. It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the method of claim 13 while adjusting the flow-rate ratio to the claimed flow-rate ratios, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. [MPEP, 2144.05; II.B]. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schindler in view of Vogt as applied to claim 12 above, and further in view of Bielefeld et al., US 2006/0105581.

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Schindler and Vogt suggest a method having all the limitations of claim 18 except for supplying helium as a carrier gas.

Bielefeld teaches using helium as a carrier gas in PECVD reactor ([0011]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine teachings of Schindler, Vogt, and Bielefeld, and to use helium as a carrier gas for stabilizing the plasma as suggested by Bielefeld ([0011]).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schindler in view of Vogt as applied to claim 19 above, and further in view of Qiao et al., US 6,803,318.

Schindler and Vogt suggest a method having all the limitations of claim 20 except for setting a temperature in the process chamber between 300°C and 500°C.

Qiao teaches that a plasma-enhanced CVD reactor uses the temperature in the range from about 200° C to about 500° C for processing tetraethyl orthosilicate (TEOS) to deposit insulation layers comprising oxides and nitrides on semiconductor substrate (column 13, lines 34 -64).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine teachings of Schindler, Vogt, and Qiao, and to use the specified temperature range for improving the layer alignment / arrangement as suggested by Qiao (column 2, lines 10 -12).

Allowable Subject Matter

Claim 22 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NIKOLAY YUSHIN whose telephone number is (571)270-7885. The examiner can normally be reached on Monday through Friday from 8 a.m. to 5 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on 571-272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NY
Examiner, Art Unit 2893

/Thomas L Dickey/
Primary Examiner, Art Unit 2826